ECO 202 Principles of Economics II
Lecture 3: Inflation

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January 26, 2018

Measuring Inflation

Recall in the previous lecture when we discussed nominal and real GDP, we said that GDP deflator is a measure of price level. Price level is a measure of average prices of goods and services in the economy.
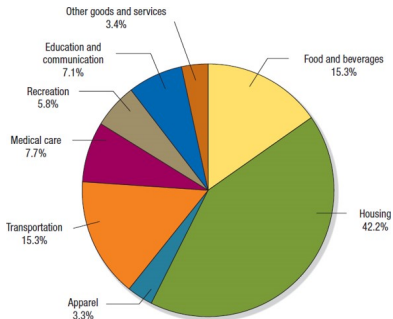
Definition

The inflation rate is the percentage increase in the price level from one period to the next.

If we measure changes in the prices of different **basket of goods**, we would come up with different measures.

Two commonly-used measures are

- The consumer price index (CPI).
- The producer price index (PPI).

Other goods and services
3.4%

Education and communication
7.1%

Recreation
5.8%

Medical care
7.7%

Transportation
15.3%

Apparel
3.3%

Food and beverages
15.3%

Housing
42.2%

- The consumer price index is a measure of the average change over time in the prices a typical urban family of four pays for the goods and services they purchase.

- The chart shows the composition of the basket of goods used to create the CPI. This basket of goods derives from a survey of 14,000 households by the BLS.

To calculate the CPI in a given year, we need

- A basket of goods.
- The cost to purchase the basket of goods in a base year.
- The prices in the current year.

The CPI in the current year is the cost to purchase the basket of goods this year, divided by the cost in the base year. By convention, we multiply this by 100, so that the CPI in the base year is 100.

Calculating the CPI

Example

		Base Year (1999)		2016		2017	
Product	Quantity	Price	Expenditures	Price	Expenditures	Price	Expenditures
Eye care	1	$50.00	$50.00	$100.00	$100.00	$85.00	$85.00
Pizzas	20	10.00	200.00	15.00	300.00	14.00	280.00
Books	20	25.00	500.00	25.00	500.00	27.50	550.00
Total			$750.00		$900.00		$915.00

Please calculate the CPI in 2016 and 2017 and the inflation rate in 2017.

Calculating the CPI

Using the basket of goods from 1999 and the current prices, we can calculate the CPI in 2016 and 2017,

$$CPI_{2016} = \frac{\$900}{\$750} \times 100 = 120, \quad CPI_{2017} = \frac{\$915}{\$750} \times 100 = 122.$$

The inflation rate from 2016 to 2017 then is the percentage change in the CPI:

$$\frac{122 - 120}{120} \times 100 = 1.7\%.$$

Since the CPI measures consumer prices, it is often referred to as the **cost of living** index. CPI-inflation is sometimes used to generate "fair" increases in wages for workers and government benefits.

Is the CPI an Accurate Measure of Inflation?

Some potential problems with the CPI:

- Substitution bias
  Consumers may change their purchasing habits away from goods that have increased in price.

- Increase in quality bias
  Difficult to separate improvement in quality from increase in price, say in cars or computers.

- New product bias
  The basket of goods changes only every 10 years. There is a delay to including new goods like cell phones.

- Outlet bias
  CPI uses full retail price, but many people now buy from discount stores or online.

For these reasons, economists believe the CPI overstates true inflation by 0.5 to 1 percentage point.

Definition

The producer price index (PPI) is an average of the prices received by producers of goods and services at all stages of the production process.

- It is conceptually similar to the CPI, in that it uses a basket of goods, but the goods are those used by producers.
- The PPI is often referred as a lead indicator (give early warning of future movements in consumer prices). Why?

Inflation Adjustment, Nominal and Real Variables

Example

Suppose your mother received a salary of \$25,000 in 1989. This would have bought much more than a salary of \$25,000 in 2014.

We can use the CPI to estimate the purchasing power of that \$25,000 in 2014 dollars:

$$\text{Value in 2014 dollars} = \text{Value in 1989 dollars} \times \frac{\text{CPI in 2014}}{\text{CPI in 1989}}$$

$$= \$25,000 \times \frac{237}{124}$$

$$= \$47,782$$

So \$25,000 in 1989 would have bought about as much as \$48,000 in 2014.

- The current standard base "year" for the CPI is an average of 1982-1984 prices.
- Values like wages in current-year dollars are called nominal variables.
- When we adjust them for inflation, by dividing by the current years price index and multiplying by 100, we convert them to real variables.

This is useful for comparing variables across time.

Example: Calculating Real Wages at Caterpillar

Example

In 2013, Caterpillar and the United Steelworkers Union signed a labor contract that froze the wages of caterpillar workers for six years.

In 2013, the average wage at Caterpillar was about \$27 per hour and the CPI was 233. Suppose the CPI rises to 260 in 2018, the last year of the contract.

Calculate the percentage change between 2013 and 2018 in the real wage earned by an average Caterpillar worker.

Example: Real Wage

We know that $Y_{2013} = Y_{2018} = \$27$, $CPI_{2013} = 233$ and $CPI_{2018} = 260$. The real wage for the amount of 2013 dollars in base year is then

$$Y_{2013} = \frac{100}{230} \times \$27 = \$11.59.$$

The real wage for the amount of 2018 dollars in base year is then

$$Y_{2018} = \frac{100}{260} \times \$27 = \$10.38.$$

Now we are comparing dollars of 2013 and 2018 in the base year, which is the period 1982-84.

$$\frac{\$10.38 - \$11.59}{\$11.59} = -10.4\%.$$

So the real wage actually declines 10.4% between 2018 and 2013.

Nominal Interest Rates versus Real Interest Rates

- Similar to the wage which is the price for labor, the interest rate is the price for capital.
- When you lend money to someone, you are letting them work for other people to make more money and hence you get the return on those money you lend.
- For example if the interest rate is 6 percent, for a $1,000 loan you get $1,060 back after one year. What is the interest rate?
- What is the real interest rate?

Nominal Interest Rates versus Real Interest Rates

Definition

The **real interest rate** is equal to the nominal interest rate minus the inflation rate. Suppose the inflation rate is π_t for year t and the nominal interest rate is r_t for year t. The real interest rate then is

$$R_t = r_t - \pi_t.$$

If prices rise by 2 percent from this year to next, then your real interest rate on the loan is only 4 percent. This more accurately reflects the cost of borrowing and lending money.
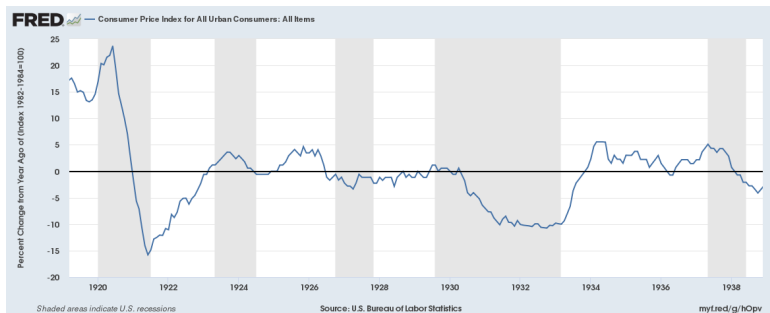
Problems with Inflation

- When do we not worry about inflation?
  - Mild increase.
  - All prices change at the same rate.
- The problem is
  - Not all prices/wages rise at the same rate.
- Recall division of income and how wealth is distributed:
  - Wage income (more affected)
  - Capital income (less affected)

- You might want to ask, if the inflation is 6% a year, I can ask my employer to peg the inflation rate to increase my wage rate 6% a year. Then problem is solved.
- It alleviates the problem, but anticipated inflation still causes:
  - The cost of holding cash.
  - Menu costs.
  - Tax for investors.

- When people cannot predict the rate of inflation, they find it hard to make good borrowing and lending decisions.
- For example, in 1980 banks were charging 18 percent or more on home loans because the rate of inflation was very high.
    - People who bought homes were locked into high rates even when inflation subsided.
- On the other hand, if banks lend money at a low rate and then high inflation takes place.
    - The real interest rate they receive may be zero or negative; thus the risk of inflation makes banks wary of lending.
      Why? Recall $R_t = r_t - \pi_t$.

Unpredictable inflation makes borrowing and lending risky.

- This figure shows the Great Recession together with deflation (falling prices).
- It creates much more serious problem for the economy than inflation.
- Why?

- Suppose you are considering buying a car. You know the car will be cheaper next year, so you delay purchasing.
- But if everyone does the same, then many purchases are postponed, firms stop producing, people become unemployed, etc.
- This can create a dangerous downward spiral, delaying economic recovery.

Solution?